

The Effect of Eccentric Strength Training on the Accuracy Index of the Spike Skill of Volleyball for Youth

Ali Jassim Mohammed¹, Prof. Dr. Anis Hussein Ali²

^{1,2} University of Babylon / College of Physical Education and Sports Sciences/Iraq.

Corresponding Author: alhmdanyl639@gmail.com

Received: 15- June -2023

Revised: 12- July -2023

Accepted: 10- August -2023

Abstract

Eccentric stretching exercises are of great importance to muscles which is used in the allocate activity, as the development of strength, speed, and accuracy in performance and reaching max desired are import to achieve to the high level, as nature of the spike performance requires the player to smooth the motor performance and the speed of reaction High and fast explosive ability of the muscles of the legs and arms and neuromuscular compatibility. The importance of the research lies in the fact that strength training by eccentric extension is one of the modern training methods that contribute to the development of the accuracy index because of its obvious importance in developing the spike hit in the volleyball game.

As for the research problem, it is that some coaches did not resort to such modern and advanced methods in the field of training, which negatively affected the technical performance of the players in the skill of overwhelming , which requires great physical effort and for longer periods of time during the game. Therefore, the researcher decided to study this problem by developing decentralized strength training exercises that would develop the strength that the player needs in order to correct it and reach the best technical performance in the indicator of the accuracy of the spike hit with volleyball.

The research objectives were: Preparing strength exercises by eccentric stretching to influence the accuracy index of the spike skill of youth volleyball. And to identify the effect of strength training by decentralized stretching in the indicator of the accuracy of the spike skill of volleyball for youth. And to identify the preference of the two groups (experimental and control) in the studied research variables for the skill of spike volleyball for young people.

Keywords: Accuracy index, volleyball and spike skill.

Introduction

The new logical and mechanical improvements that the world is seeing in the fields of sports have forced new skylines in every logical establishment and headings, including sports sciences, for example, sports preparing and biomechanics, which are seeing a wide advancement in view of current speculations. Therefore, it has become necessary to use various methods and methods in education and training. Athlete in order for the athlete to reach the level of achievement.

And since the volleyball is one of the games team that notes a great levels in the way of playing, it made winning a difficult task for the team because of the fast pace and dynamic style of this game when practicing its motor skills and analyzing the variables on which the performance of these skills depends, especially offensive,¹ and from the biomechanical aspects. And the accuracy of performance, as the game requires a greater extent in the muscles of the muscle groups operating in the upper limb (such as the arms) and the lower limb (such as the two legs), which serve motor work, especially in offensive skills that require mutual action between the muscles of the lower limb and the muscles of the upper limb that work to develop skillful performance up to better performance. ²Therefore, the study of the spike skill using training methods and modern tools in the field of training and biomechanics, as it enables the workers on it to improve and develop the mechanical aspects and

the accuracy of performing the spike strike, which the coach must upgrade according to training data and weaknesses that workers in the field of volleyball training must know.³ The correct scientific work is in knowing and directing direct exercises in treating weaknesses, whether they are mechanical or in the accuracy of performance. Strength training is done by decentralized stretching, which works to develop the general muscles in performing the skill of spike, and spending less energy in performing the motor duty (smashing beating). The qualities of strength and flexibility play an important role in the accuracy of performing the spike skill.⁴

Eccentric stretching exercises are of great importance on the most specific muscles used in allocate activity, and the use of these exercises according to a sound scientific approach has a positive impact in the advanced stage, as the player during the advanced stages has the ability to respond and adapt to such type of exercises and thus give them the ability To perform the spike skill as required, especially if this method is mechanically correct. ⁵Through the foregoing, the importance of the research lies in subjecting the sample to decentralized strength training in order to verify its suitability and ability to provide young players with physical capabilities that contribute to the development of the values of biomechanical variables, which leads to an improvement in the skill level, which benefits them and supplies the national teams. Through which the goal of the message is achieved.

Research problem

The researcher and his observation of club training, and the fact that the researcher is one of the practitioners of this game, he noticed a lack of interest in modern training methods, especially strength training with decentralized stretching, which many coaches of age groups, including youth, may be ignorant of. There is also a weakness in the skillful performance of the spike hit, specifically the moment of rising and jumping when performing the spike hit, so it was necessary to pay attention to this skill by trainers and researchers, not only in terms of educational and training programs, but in terms of upgrading the level of technical performance (technique) of this skill to the present. Optimal by focusing on teaching and training it using advanced scientific exercises, devices and techniques to assist in this, and since all player movements such as running, jumping and throwing require decentralized muscle contraction preceded by a movement opposite to the required movement. This means that the muscles stretch before contracting in the desired direction and many scientific sources confirm that the expansion preceded by contraction enhances the work of the resulting force when performing the central contraction of the same muscle with a meaning movement such as the spike beating.

Therefore, the researcher wanted to study this problem by developing strength training with decentralized stretching that would develop strength, speed, and some angles of the body that the player needs in order to correct them and reach the best technical performance in the volleyball.

Research objectives

1. To identify the effect of strength training by eccentric stretching on the indicator of the accuracy of the spike skill in youth volleyball.
2. The new logical and mechanical improvements that the world is seeing in the fields of sports have forced new skylines in every logical establishment and headings, including sports sciences, for example, sports preparing and biomechanics, which are seeing a wide advancement in view of current speculations.

Research hypotheses

1. There is a constructive outcome of strength training by eccentric stretching on the indicator of the accuracy of the skill of spike in youth volleyball.
2. There is a preference for the experimental group over the control group in the post-tests in the accuracy index in the skill of spike the youth volleyball.

Research Methodology and Field Procedures

Research Methodology

The specialist involved the trial strategy in the way of the two equivalent gatherings because of its reasonableness to the idea of the issue and to accomplish the targets and speculations of the examination, as the exploratory method is the true test of the relationships for one reason or the other and represents the most honest approach to solving many scientific problems in a practical way, as what represents the community of accurate scientific activity is the use of experiment.⁶

The research community and its sample

The objectives that the researcher sets for his research and the procedures that follow will determine the nature of the sample that he will choose, and he must choose a sample for his research that is truly representative of the original population, i.e. in the sense that the sample is the original statistical community with all its characteristics, but in a miniature form and that it represents the statistical community from which it was drawn.⁷

The community researcher identified the clubs of the Middle Euphrates region for youth volleyball, whose ages range from 17-19 years, and the research sample was randomly selected (lottery), the Hashemite Club for the 2022-2023 sports season, and they numbered (16) players, 4 players were excluded, and they are (libero) players. And the players (the preparers) because they are subject to a special training curriculum for the nature of their skill, which differs from the spike skill. Thus, the total research sample was (12) players, and they represent (30%) of the research community.

They were divided randomly into two groups, experimental and control, with (6) players per group.

The homogeneity and equivalence of the sample

Homogeneity of the sample

To confirm the homogeneity of the example, the scientist went to certain lengths to change the factors, albeit the chose test is of a nearby age, and the homogeneity was performed on the sample together before dividing it into two groups, experimental and control.⁸

Consequently, factual techniques were utilized through the mean, standard deviation, and the coefficient of variety for morphological estimations and biomechanical factors to figure out the truth of the distinction or not, and Table (2) makes sense of this. It was demonstrated that the worth of the coefficient of distinction is under 30%, and the sources notice that at whatever point the coefficient of contrast is under 30%, this implies that the example is homogeneous.

Equivalence of the two research groups

One of the significant things that the analyst should follow is to return the distinctions to the trial factor. On this premise, the control and trial bunches should be identical in all factors and pointers totally. Subsequently, factual strategies were utilized through the mean, standard deviation, and a t-test for free examples (between the exploratory and control gatherings) prior to applying the strategy, as displayed in Table (1).

Table 1. Shows the means, standard deviations, the calculated (t) value, and the (Sig) value for the experimental and control groups in the pre-test

Variable	Unit	Control group	Experimental group	(t) calculated	Sig.	Indication type
----------	------	---------------	--------------------	----------------	------	-----------------

		Mean	STD	Mean	STD			
Accuracy index	Degree/Sec.	3.24	1.33	3.47	1.04	4.83	0.61	Non Sig.

Methods The means, devices and tools used in the research

- Arabic and foreign sources and references.
- Note.
- Interview.
- Testing and measurement.
- Motion analysis program (Tracker)
- Chinese (Lenovo) laptop.
- Camera for the purpose of analysis, type (Canon), at a speed of (1200) frames / sec, number (1)
- 2 Canon cameras.
- Medical scale (kg) to measure weight.
- 1 manual calculator (CASIO).
- Stopwatch.
- (15) legal volleyballs.
- Measuring tape number (1).
- Various stationery (papers, pens, etc.).
- Sticky tape.
- The volleyball court is legal.

Field research procedures

These procedures aim at introducing all the procedures that the researcher has accomplished in order to prepare for collecting the necessary data to answer the research objectives and verify the validity of the hypotheses.

Tests and variables used in the research:

After reviewing the scientific sources and consulting with the supervisor and the scientific committee to approve the title, a set of tests and variables were determined as follows:

1. Testing the volleyball spike accuracy index .⁹
 - Purpose: to measure the spike accuracy index in the diagonal and straight directions.
 - Tools: volleyball court, 15 legal volleyballs, a coach, two mattresses placed in size (150 cm long * 1 wide), one center mattress is placed in an area measuring 250 cm long * 150 cm wide, and a center (5) in area 1 * 1 m and diagonal images as in the figure.
 - Performance specifications: The tester performs the spike blows from the center (4) by preparation by the trainer, from the center (3), and the tester has to perform (5) spike blows in the diagonal direction, the order in the center (5), and (5) other spike blows Towards the straight direction the rank in the center (1).
 - How to register:¹⁰
 - * (4) Points for each correct smash hit in which the ball lands on the mattress.
 - * (3) Points for each correct smash in which the ball lands in the planned area.
 - * (2) Two points for each correct smash hit in which the ball falls in areas (A - B).

* Zero for each failed smash.

* The test score is divided by the time taken from the moment the ball contact with the striking hand was broken to the moment the ball contacted the ground.

Pilot studies

1. The first pilot study

The researcher conducted the first exploratory experiment on Tuesday, 6/12/2022, at ten o'clock in the morning, in the closed hall in the College of Physical Education and Sports Sciences, University of Babylon, on a sample of players from Al-Qasim Club, one of the youth volleyball research community clubs, to apply to test the spike accuracy index and the force measurement platform. And that this experiment for the researcher is a practical training to find out all the positives and negatives that the researcher may face during conducting the main experiment to avoid them .¹¹

The aim of the pilot experiment was the following:

- To identify all the problems facing the researcher through the main experiment.
- Identify the appropriate tools and devices to conduct the test.
- Identify the distances and heights in which cameras should be placed.
- Knowing the appropriate time and place to take the test.
- Ensure the adequacy of the auxiliary staff .
- Defining the assisting staff on how to apply the test.

2. The second pilot study

The second pilot study was conducted on Thursday, 12/8/2022, at ten in the morning, in the Rapid Response Hall for Body Building in the Hashemite District, on the research sample.

*Strength training was applied by decentralized stretching, and the aim was to:*¹²

- Find out the extent of the sample's ability to apply the exercises.
- Knowing the time needed to apply the exercises.
- Determine the components of pregnancy (intensity, size, comfort).
- Organizing the work of the assistant staff.
- Knowledge of the difficulties and problems that the researcher faces in applying the exercises before applying them in the main experiment.

The main experiment

Pre-test and photocopy of the research sample

The researcher conducted the test and pre-measurement for the experimental and control groups before starting the strength training by decentralized stretching on Wednesday 14/12/2022 at ten o'clock in the morning in the closed hall in the College of Physical Education and Sports Sciences, University of Babylon. All (12) members of the research sample attended to perform a test The indicator of the accuracy of the spike strike and the platform for measuring the strength, as it was placed in its appropriate place, and the cameras were installed in its designated place on the right side of the player who performs the skill of the spike strike, at a distance of (6.50 m) and a height of (1.42 m), so that the player's movement was depicted from the moment of approach to The moment of and landing.

Filming was done with three video cameras, one with a speed of 300 images/sec for the purpose of analysis and extraction of the Biocinematics variables under study, the other with 25 images/sec for the purpose of photographing and documenting the test, and the third with a speed of 25 images/sec for the purpose of

synchronizing the calculator with the platform and documenting the moments of the beating. Draw a length of (1) m to find out the real value that appears in the film.¹³

Eccentric strength training

In the wake of finishing the execution of the pre-test, the scientist utilized the activities arranged inside the preparation program assigned to them, and they were by the following:¹⁴

1. The preparation program began on Sunday 12/18/2022.
2. The preparation strategy utilized in strength preparing by unconventional extending is the dreary preparation technique, and the power ran between (90-100 percent).
3. The scientist applied the activities during the unique readiness time frame, which endured two months, at the pace of (3) units each week, and the days were (Sunday, Tuesday, Thursday), where the complete number of preparing units arrived at 24 preparation units.
4. After deciding the greatest power for every player while playing out the activities and deciding the loads for every player, the execution of the activities started by prolonging the muscle worried in the activity to the most extreme level, and after the player opposes the weight and as per the force determined in the preparation unit for a while, then, at that point, the mentor builds the stretching of the muscle somewhat And afterward rest.
5. The activities are given under the management of the coach.
6. The end date of the experiment was Thursday, 9/2/2023.

While the control group applied its usual training program at the same time as the experimental group.

Testing and post imaging of the research sample

The post-test for the examination test was led on Tuesday 14/2/2023 in the shut corridor of sports in the School of Actual Training and Sports Sciences, College of Babylon. After the finishing of the time of use of the educational plan, which took two months, the analyst was quick to give the pre-test conditions and techniques used to test the specialized (strategic) execution of the spike ability of the volleyball.

Results and discussions

- **Presenting and analyzing the results of the differences in the accuracy index values when performing the spike multiplication skill for the pre and posttests of the control group.**

Table 2. Shows the upsides of the mean, standard deviations, the determined (t) an incentive for the upsides of some Biocinematics factors, and the accuracy index for the pre and posttests of the control group

Variable	Unit	Pretest		Posttest		(t) calculated	Sig.	Result
		Mean	STD	Mean	STD			
Accuracy index	Degree/Sec.	3.24	1.33	4.14	1.25	2.81	0.04	Sig.

Through the biomechanical examination of the exploration test people, table (6) shows the aftereffects of the exactness record values for the benchmark group while playing out the spike (askew) increase ability. For related examples, and through Table (6), the factors were introduced and examined as follows.

The mean of the exactness list variable for the staggering duplication expertise in the pre-test was (3.24) with a standard deviation of (1.33), while the mean of the exactness record variable for the mind-boggling increase expertise in the post-test was (4.14) and with a standard deviation of (1.25) while leading a (t) test for the examples. It gave the idea that the determined (t) esteem was (2.81) with a degree of importance (0.64). Through the prior, we see that there are tremendous contrasts in the variable of the precision list in the exhibition of the spike expertise because of the activities followed by the mentor, as well as the example's obligation to join in and apply the preparation educational plan ready by the mentor.

- **Presentation, analysis and discussion of the results of the differences in the values of the accuracy index when performing the spike multiplication skill for the pre and posttests of the experimental group**

Table (3) .Shows the values of the mean, standard deviations, the calculated (t) value for the values of some Biocinematics variables, and the accuracy index for the pre and posttests of the experimental group

Variable	Unit	Pretest		Posttest		(t) calculated	Sig.	Result
		Mean	STD	Mean	STD			
Accuracy index	Degree/Sec.	3.47	1.04	6.45	1.47	4.83	0.64	Sig.

Through the dynamic examination of the individuals from the exploration test, table (8) shows brings about the upsides of the exactness list of the exploratory gathering while playing out the ability of spike (askew) from the middle (4). As displayed in the above table, the idea of the exploratory gathering of the examination showed massive contrasts between the upsides of some biomechanical factors The outcomes were handled measurably by the (t) test for related examples, and through Table (8) the factors were introduced, broke down and talked about as follows.

The mean of the exactness file variable for the mind-boggling duplication expertise in the pre-test was (3.47) with a standard deviation of (1.04), while the mean of the precision record variable for the staggering augmentation ability in the post-test was (6.45) with a standard deviation of (1.47) while directing a (t) test for the examples It created the impression that the determined (t) esteem was (4.83) with a degree of importance (0.64). Through the prior, we see that there are tremendous contrasts in the precision list variable in playing out the spike expertise. The specialist credits this advancement to the viability of the preparation educational plan and strength preparing by decentralized augmentation, which added to the improvement of biomechanical factors.

The specialist found that the improvement in the Biocinematics factors, particularly the speed of the ball sending off coming about because of the speed of development of the striking arm, has assisted in the advancement of the spike precision with ordering by utilizing quick developments that assisted with cleansing the exhibition. In the first place, prior to focusing on its solidarity, all of this, as per the examination, has prompted serving the principal part of the expertise, and hence the precision of its exhibition will positively increase.15 Subsequently, the scientist accepts that the utilization of all out reiteration of execution and the utilization of power by decentralized expansion has assisted the players with dominating the hostile ability all the more precisely by guiding the ball to the point The event wherein the raving success is planned in a more viable manner without distraction with arriving at the spot from which the raving success is expected, on the

grounds that the place of the body has become at the right point of rise has settled this issue. In this way, the preparation educational program has accomplished changing the factors with the exactness record. The scientist accepts that the higher the leap level, the more prominent the exactness file, on the grounds that the level oversees the precision regions because of his high level, which prompts the player having the option to check the rival group's field out.¹⁶

- Presenting, analyzing and discussing the results of the differences in the values of the index of the accuracy of the spike multiplication when performing the skill of the spike multiplication for the post-tests of the control and experimental groups:

Table 4. Shows the values of the mean, the standard deviations, the calculated (t) value for the values of some Biocinematics variables, and the index of the accuracy of the spike multiplication of the post-tests for the control and experimental groups

Variables	Unit	Control group Posttest		Experimental group Posttest		(t) calculated	Sig.	Result
		Mean	STD	Mean	STD			
Accuracy index	Degree/Sec.	4.14	1.25	6.45	1.47	3.59	0.003	Sig.

Through the kinetic analysis of the research sample individuals, table (10) shows results in the values of the accuracy index for the control and experimental groups when performing the spike (diagonal) skill from center (4). As shown in the above table, the nature of the research sample individuals showed significant differences between the values of the variables Biocinematics The results were processed statistically by the (t) test for independent samples, and through Table (10) the variables were presented and discussed as follows.

The mean of the accuracy indicator variable for the spike skill in the post-test of the control group was (4.14) with a standard deviation of (1.25), while the mean of the accuracy variable for the spike skill in the post-test of the experimental group was (6.45) with a standard deviation of (1.47) and when conducting a test (T) for the independent samples, it appeared that the calculated (T) value was (3.59) with a level of significance (0.003). Through the foregoing, we see that there are significant differences in the accuracy variable in the performance of the spike skill and in favor of the experimental group. The researcher attributes the reason for this to strength training by decentralized stretching and exercises of the training curriculum used in terms of stress, repetitions and appropriate rest periods, which led to the development of the results of the accuracy test." Directing voluntary movements towards a specific goal requires high efficiency from the muscular and nervous system. Accuracy requires complete control of voluntary muscles to direct them towards a specific goal" .¹⁷

The higher the player is above the level of the net and the larger the capacity of the ball, the higher the accuracy. Knowing that the relationship is inverse between accuracy and the speed of the ball, the speed of the ball must not be so high as to lose the accuracy factor, but it must be at a level commensurate with the speed of the striking hand, so there must be a proportion between the two variables. That there is a significant difference in the results of the control and experimental groups and in favor of the experimental group, and this is attributed by the researcher to the training curriculum, which led to the development of the strength characteristic of the speed of the two men, and this was reflected positively in developing the accuracy of the skill of spike the diagonal, "as the higher the jump height, the greater the accuracy, because Height gains the hitter control over the areas of accuracy and the player gains a sharp angle in the ball to the court of the opposing team", and as it is known, accuracy means that the player has the ability to score a point or a goal. The team, and accuracy is one of the important components in the game of volleyball when performing the skill of spike, as through it the result is decided by winning or losing the team. Therefore, the volleyball player is

required to possess the strength characteristic of speed in the muscles of the body and compatibility in order to be able to perform this skill with maximum strength, speed and accuracy in performance.¹⁸

That there is a statistically significant direct correlation between the power characteristic of speed and the accuracy of the spike strike),¹⁹ and that the volleyball player is always on the field, whether he is in a defensive or offensive state, and thus, in addition to possessing the qualities The main physical, it needs strength distinguished by speed when performing skills, and thus when performing the spike skill it needs neuromuscular compatibility and when performing the spike strike with strength and fluidity in movement when performing the ball, and this is consistent with what the motor performance of the skill depends on special motor abilities.²⁰

Conclusions

The eccentric strength training had a significant impact on developing the accuracy index values of the experimental group, since these exercises work to develop the ability. The most important recommendations are the use of decentralized strength training, which works to develop biomechanical variables (kinetic and kinetic) for youth volleyball players.

Recommendations

1. Emphasis on the use of strength training by eccentric stretching according to the plyometric training method, because it is appropriate in such exercises.
2. Using different sizes, stresses and ripples in pregnancy, which may lead to better results.
3. Emphasis on developing the accuracy index, which leads to better mastery of skillful performance and achieves the accuracy index in the performance of spike .
4. The need for coaches and players to have mechanical information to identify the performance minutes of the spike skill.

References

1. Ibrahim Ahmed Salameh: Research Methods in Physical Education, Dar Al-Maarif, Cairo, 1980, p. 49.
2. Abu El-Ela Ahmed Abdel-Fattah: The Plateau of Power and How It Can Be Overcome, Regional Development Center, Athletics Bulletin, Cairo, 1992.
3. Ahmed Amin Akour: Kinematic analysis and its relationship to the accuracy of the spike blow of both types and the low volleyball, (Master's thesis, University of Baghdad, College of Physical Education, 2000).
4. Ahmed Amin Akour; Kinematic analysis and its relationship to the accuracy of the smash hit with both types of low and volleyball, master's thesis, University of Baghdad, College of Physical Education, 2000.
5. Ahmed Issa Al-Bourini, Sobhi Ahmed Kaplan: Volleyball Skills - Training - Injuries, 1st edition, Amman, Arab Community Library, 2012.
6. Haider Shamkhi Jabbar: A comparison of the values of some biomechanical variables for the performance of the spike hit and their relationship to accuracy between centers (1) and (6) for volleyball applicants, PhD thesis, College of Physical Education and Sports Sciences - University of Babylon, 2009.
7. Haider Abdul-Razzaq Kazem: Policies of Scientific Research Writing in Physical Education and Sports Sciences: 1st Edition, Al-Ghadeer Printing and Publishing Company, Basra University, 2000 AD.
8. Risan Kharibet and Najah Mahdi, Kinetic Analysis (University of Basra, Dar Al-Hikma, 1992).
9. Nuri Ibrahim Al-Shawk (and others): Statistics and tests in the mathematical field, 1st edition, Erbil, 2010.
10. Hisham Ali Al-Aqraa: The effect of neuromuscular facilitation training on improving the level of digital achievement of the high jump skill among a sample of students from the Faculty of Physical Education - Gaza, published research, Al-Zaytoun Magazine, 2011.

11. Wajih Mahjoub: Scientific Research Methods and Methods, 2nd Edition, Baghdad: Dar Al-Hikma for Printing and Publishing, 1993.
12. Wajih Mahjoub: Kinesiology (kinesthetic learning), Dar Al-Kutub for printing and publishing, University of Mosul, 1989.
13. Arie Slinger: Power Volley ball. The serve , 1995.
14. Brittenham , Greg."Safe plyometrics',The complete coide to volleyball conditioning. publisher performance conditioning volleyball ,1997, pp.16-18. John & Nelson, 1989, practical Measurements For Evaluation in Physical Education Minnesota. Burgess Publishing Co.
15. Dirix, A. (and others). The olympic boox of sports medicine. London: blak well scientific publication, 1988.
16. doris t.miller, Richard g. nelson, biomechanics' of sport le x and cider Philadelphia,1973.
17. Fasen, J.M. O'Connar AM, Schwartz SL, Watson JO, Plataras CT, Garvan CW, et al.(2009):op.cit Reference. 2009.
18. Funk DC, Swank AM, Mikla BM, Fagen TA, Farr BK.Impact of Prior
19. Tom Seaborne: Flexibility stretching PNF al Ballistic stretch reflex Golgi tendonorgan, American college of sports medicine, 2002.
20. Yıldırım MS, Ozyurek S, Tosun O, Uzer S, Gelecek N.(2016). Comparison of effects of static, proprioceptive neuromuscular facilitation and Mulligan stretching on hip flexion range of motion: a randomized controlled trial. Biol Sport. 2016.